

February 28, 2014

U.S. Environmental Protection Agency  
Office of Ground Water & Drinking Water  
**Email address:** [GSRuleGuidanceComments@epa.gov](mailto:GSRuleGuidanceComments@epa.gov)

**Subject:** *Draft Underground Injection Control (UIC) Program Guidance on Transitioning Class II Wells to Class VI Wells (EPA 816-P-13-004, December 2013).*

Enclosed please find comments on the *Draft Underground Injection Control (UIC) Program Guidance on Transitioning Class II Wells to Class VI Wells* (December 2013) prepared by Battelle researchers working on the Midwest Regional Carbon Sequestration Partnership (MRCSP) program. We appreciate the opportunity to comment on guidance documents for geologic sequestration. These comments reflect Battelle's experience in permitting and implementing three MRSP Phase II CO<sub>2</sub> injection tests, the MRCSP Phase III project, the AEP Mountaineer CCS Demonstration, and the FutureGen 2.0 project. ***While the MRCSP includes nearly 40 different members, the comments expressed herein do not necessarily reflect opinions of the individual members of the MRCSP.***

If you have any questions or require additional information, please contact me at my office (614) 424-3820, e-mail [gupta@battelle.org](mailto:gupta@battelle.org).

Sincerely,



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## **Review and Comments on Draft Guidance Document**

### ***Draft Underground Injection Control (UIC) Program Guidance on Transitioning Class II Wells to Class VI Wells (December 2013)***

**Prepared by Neeraj Gupta, Lydia Cumming and Joel Sminchak for Battelle/MRCSP  
February 28, 2014**

## **Introduction and Background**

This document summarizes comments on the *Draft Underground Injection Control (UIC) Program Guidance on Transitioning Class II Wells to Class VI Wells (EPA 816-P-13-004, December 2013)*. The comments provided below reflect Battelle's experience in permitting and implementing three MRCSP Phase II CO<sub>2</sub> injection tests and the MRCSP Phase III project CO<sub>2</sub>-EOR project, as well as work on several other research projects during last 17 years of CCS research at Battelle.

The MRCSP is one of seven partnerships in a nationwide effort to determine regionally-appropriate carbon sequestration options and opportunities. These partnerships are part of an overall effort by the U.S. Department of Energy's National Energy Technology Laboratory (DOE/NETL) to develop robust strategies for mitigating CO<sub>2</sub> emissions. The MRCSP was formed to assess the technical potential, economic viability, and public acceptability of carbon sequestration within its Region (i.e., Indiana, Kentucky, Maryland, Michigan, New Jersey, New York, Ohio, Pennsylvania, and West Virginia).

The MRCSP includes nearly 40 organizations from the research community, energy industry, universities, non-government, and government organizations. In the first phase of research, which took place over a two year period ending in September 2005, the MRCSP characterized carbon sequestration opportunities in the region. The second phase, which took place over a nearly six year period ending in April 2011, involved three small-scale field tests of sequestration in different locations around the region to evaluate various sequestration options in real world settings. All three Phase II field tests were completed successfully in terms of relations with the industrial hosts, outreach to the local communities, permitting, and test logistics. The MRCSP program is now in its third phase. The Phase III project involves injection, monitoring, and modeling of more than 1 million metric tons CO<sub>2</sub> in an enhanced oil recovery setting in northern Michigan.

## **General Comments on Proposed Guidance**

The guidance focuses primarily on Class VI permitting of wells transitioning from Class II to Class VI. Key areas where we believe that additional clarification is required include the following:

- **Role of the Class II Director**

EPA designed the Class II regulations to minimize risks to USDWs. The EPA Class II director is primarily responsible for ensuring the Class II well operator is operating in full compliance with its Class II permits to provide full protection to USDWs. The role of the Class II Director should be defined in this guidance document. A Class VI Director does not have primary authority to exercise jurisdiction over a well operating under a Class II permit. The Class VI rule does not assign the decision as whether there is a change in authorized operation of a Class II EOR project or an increased risk to USDWs to the Class VI

*These comments have been prepared by Battelle researchers as part of their work for MRCSP. They do not necessarily reflect the official view of Battelle, the U.S. DOE, or sponsors and members entities of MRCSP.*

Director. Furthermore, in many states, it is likely that the Class II authority will lie with the oil and gas regulators and Class VI with the environmental regulators who typically permit waste injection. It is important to clarify the relative jurisdictions and mechanisms for sharing information for decision making between Class II and Class VI regulators.

- **Factors Identifying the Need for a Class VI Permit**

The guidance document would benefit from a more detailed discussion of the factors that are to be considered in determining whether there has actually been a significant increase in the level of risk to USDWs compared to Class II operations.

While EOR operations and geologic storage operations may present different risk profiles, there is a lack of evidence that the risk of endangerment to USDWs is “likely to increase” when the operation of a well or group of wells changes from an enhanced recovery to permanent storage in the same reservoir. In fact, formations that previously contained oil have proven seals because the oil has accumulated there over geologic time.

Finally, the guidance document should differentiate between geologic storage that occurs during injection of CO<sub>2</sub> for EOR and operations being conducted for the primary purpose of permanent geologic storage. For example, the production of CO<sub>2</sub> previously stored for EOR operations should not require a Class VI permit. Nor should a Class VI permit be required for the injection of CO<sub>2</sub> for short-term storage with the future intent to produce that CO<sub>2</sub> for use in EOR.

- **Conditions that should be included in new Class VI permits for transitioning wells**

Overall, the guidance document appears to suggest that Class II wells transitioning to Class VI may require the same characterization, monitoring, and closure requirements as a full Class VI permit. As a result, the guidance is difficult to interpret because there are many requirements that cannot or should not be applied for existing Class II wells. Moreover, significant uncertainty is created when the guidance suggests that potential operators consult with the ‘director’ to determine the most appropriate requirements for their well. Many depleted oil and gas reservoirs represent appealing opportunities for CO<sub>2</sub> storage, but the pursuit of these opportunities under Class VI requirements faces many challenges using this draft guidance.

The guidance document often uses phrases such as “more comprehensive” when describing Class VI requirements, which appears to suggest that the Class II regulations are somehow insufficient although that is not the case. The operator applying for a Class VI permit for a transitioning Class II well has a choice of whether to meet the regular Class VI construction requirements or demonstrate to the EPA Class VI director that the well was engineered and constructed to meet the performance standard. The following guidance (Page 35) was helpful:

- To successfully re-permit a Class II well as a Class VI well, the key requirement regarding construction is to demonstrate to the Class VI UIC Program Director that the well, as constructed and completed, will prevent fluid movement into or between USDWs or into any unauthorized zones pursuant to requirements at 40 CFR 146.86(a)(1) under the conditions anticipated for GS.
- If the Class II well was constructed for injection of carbon dioxide for enhanced recovery purposes, it may be sufficient to demonstrate to the Class VI UIC Program Director that

such suitable materials were used and that these materials have not degraded as a result of past operations.

- Essentially, in order to demonstrate that the construction is adequate, the owner or operator must demonstrate that the well has both internal and external mechanical integrity and will be able to maintain mechanical integrity throughout the life of the project to meet the requirements of 40 CFR 146.81(c).

### **Specific Comments on Proposed Guidance**

**Page 16, Factors for Identifying the Need for a Class IV Permit-** This section gives the impression that CO<sub>2</sub> storage is more risky than enhanced oil recovery operations. However, there are different perspectives on risk factors for both saline storage and EOR. Even though the EOR sites may be considered less risky due to presence of a proven seal, other risk factors – e.g., well density, existing wellbores, and presence of oil and gas - would need greater attention for EOR sites.

**Page 19, Increase in Reservoir Pressure-** A discussion of original reservoir pressure should be included here. Many depleted oil and gas formations were at high pressures before being developed. A reasonable assumption is that these same pressures would be safe for CO<sub>2</sub> storage, especially considering that methane is more mobile than CO<sub>2</sub>.

**Page 19, Increase in Reservoir Pressure Equation-** Most Class II UIC programs have equations that define maximum allowable surface injection pressure based on a generic fracture gradient, density of injected fluid, and some safety factor. Please include a comparison of these equations with the equation presented here. For example, in West Virginia, the maximum bottom hole injection pressure is defined by the equation as:

Maximum bottom hole injection pressure = 0.80 psi/ft × top injection zone perforation depth – 0.433 psi/ft × injection fluid specific gravity × top injection zone perforation depth

**Page 33, 4.2.1 Construction and Logging Requirements and Considerations for Wells Transitioning from Class II to Class VI-** This section is confusing because many of the items listed here would not be possible for Class II wells, which are already completed for injection, being transitioned to Class VI. For example, whole or sidewall core testing, open-hole logs (i.e., resistivity, image, spontaneous potential, caliper, and density logs), and caprock testing would not be possible in an existing Class II well because the Class II injection wells is likely cemented with casing. Instead, the document should list realistic or reasonable expectations for transitioning Class II wells rather than a catch-all listing of Class VI requirements.

**Page 33, Box. Suggest changing table caption to say that these tools are just examples.** It is not necessary for all wells transitioning to Class VI to be constructed to allow the use of all of the items listed in the box on page 33 if the well is constructed so as to allow the use of tools that are sufficient to meet all of the applicable requirements of the rule. If a different tool can be used and still satisfy the requirement, it would not be necessary that the well be constructed to allow the use of some other tool that might also be used to meet the requirement.